FishVis

A web-based decision support mapper for understanding the response of fish species and stream temperature to climate change in the Great Lakes region

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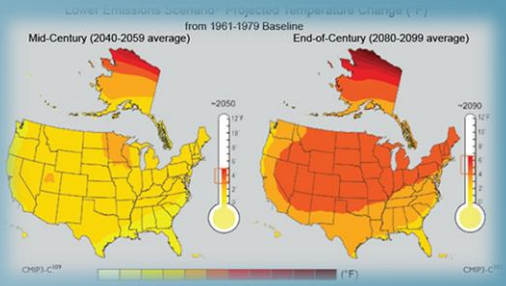
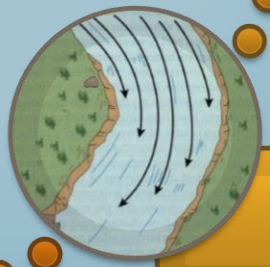
Understanding and Planning for Climate Change



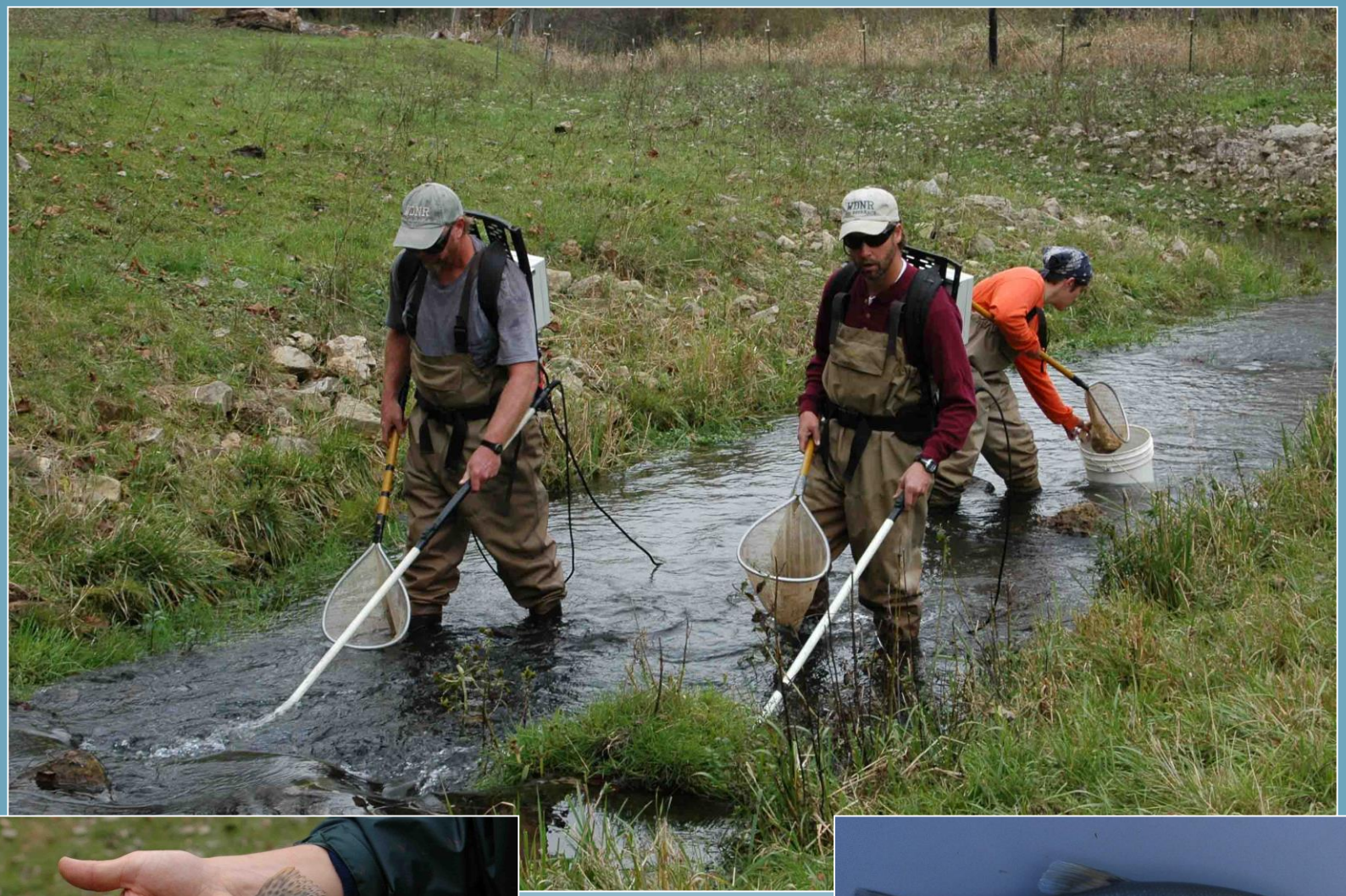
Climate change



Stream temperature

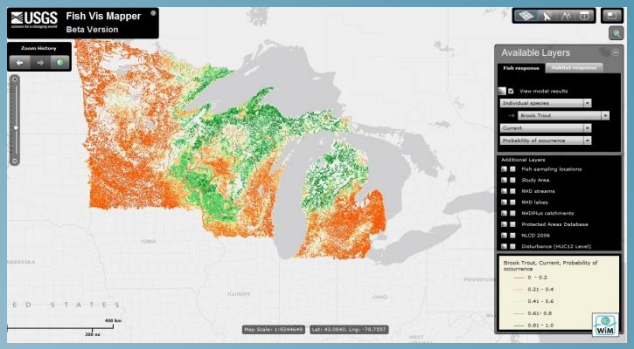
Fish

What will this mean for streams and their fisheries?

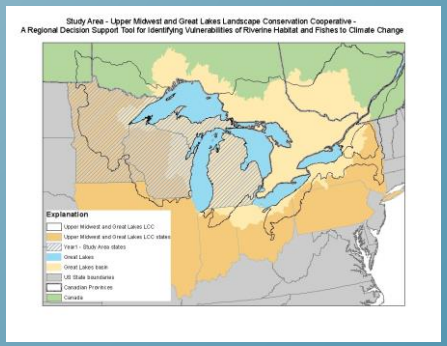


?? or ??

What is FishVis?

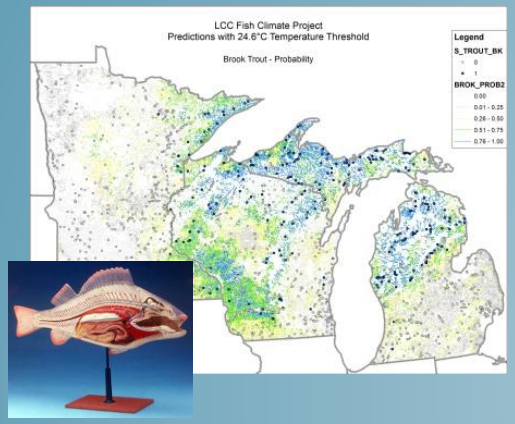


- Web-based decision support mapper
- Visualize potential climate driven responses for thermally representative fish species
- Tool for use by managers and scientists in understanding and decision making
- Display, Navigate, View, Interrogate, Download results of Fish Climate Vulnerability analysis
- Uses ArcServer and Web services
- No downloads required



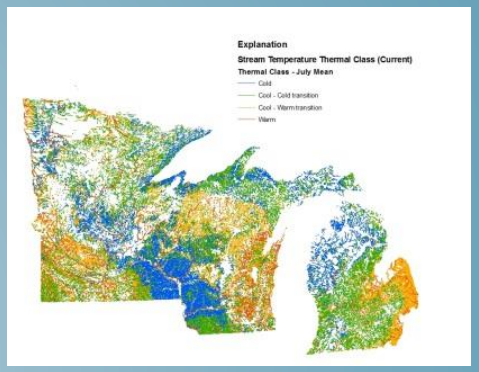
View Results in FishVis

Time Periods
- Current
- 2046 – 2065
- 2081 - 2100



Predicted distributions for 14 fish species

13 future climate predictions



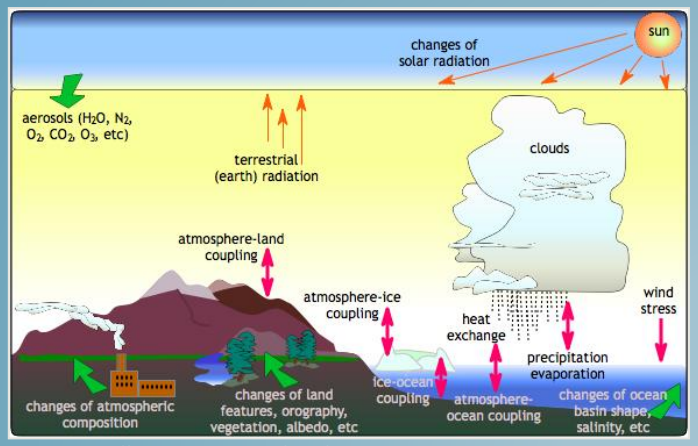
Predicted thermal classes for streams

Download the results for planning

$$$$

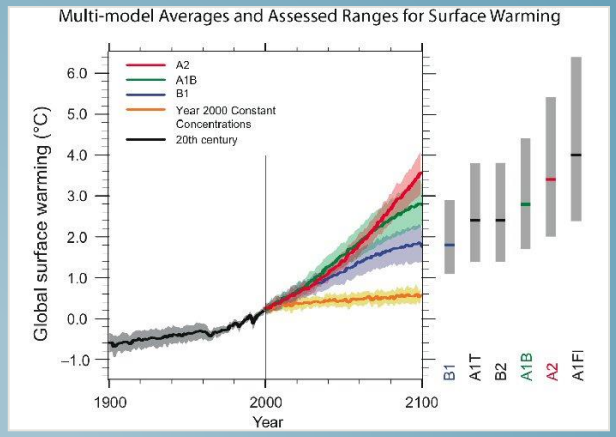
FISHVIS – Climate Inputs

13 Global Climate Models

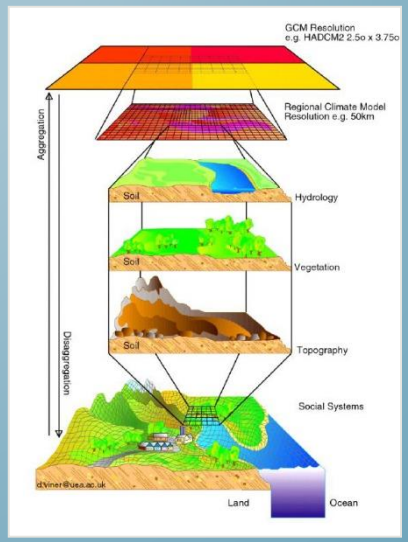


http://en.wikipedia.org/wiki/File:Global_Climate_Model.png

1 Emissions Scenario (A1B)



http://www.narccap.ucar.edu/about/emissions.html



Statistically downscaled from 300 km to 10 km grids

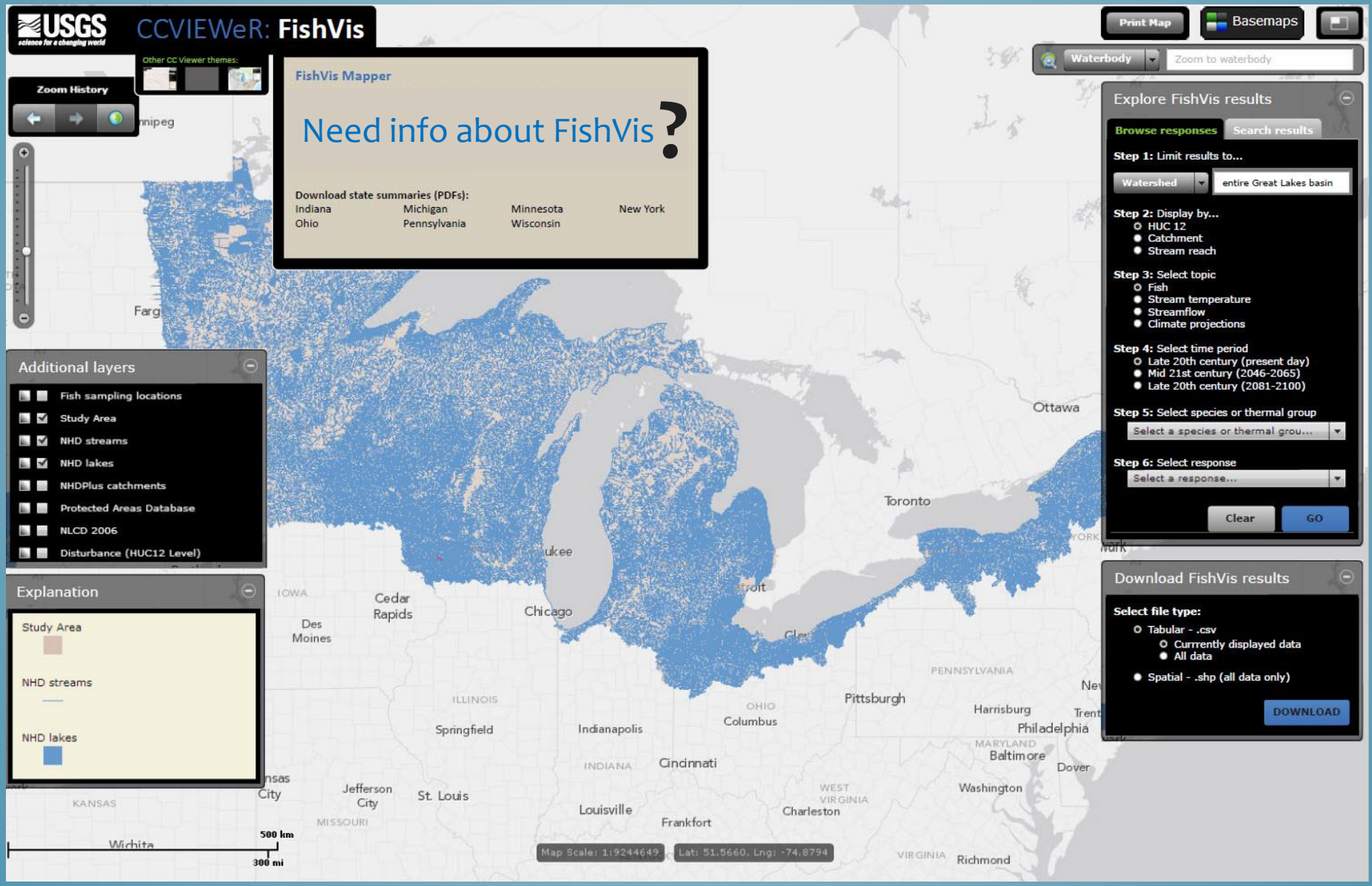
Output:
Air temperature & precipitation (attributed to NHDPlus)

- 13 GCMS
- time periods
  - Current
  - 2046 – 2065
  - 2081 - 2100

(UW Madison – Center for Climatic Research – Dan Vimont and others)

INTRODUCING

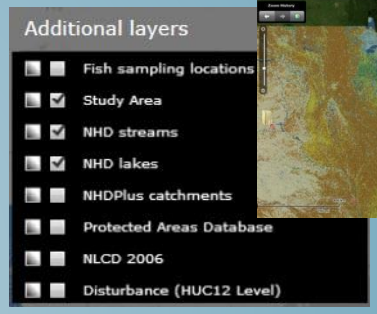
USGS science for a changing world
Fish Vis Mapper
Beta Version



FishVis the Basics

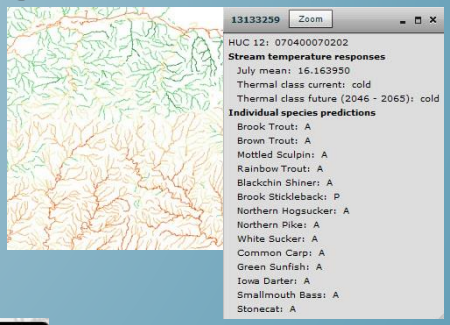
Basemaps: Change basemaps

Available Layers: Turn on and off layers



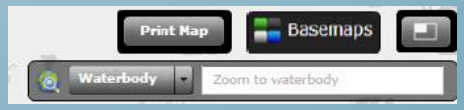
Navigation: Zoom – pan

Pop-Ups: Click on point - get results for stream reach

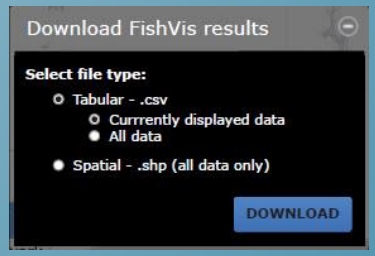


Search : type place name; searches basemap

Print : print a map of your results

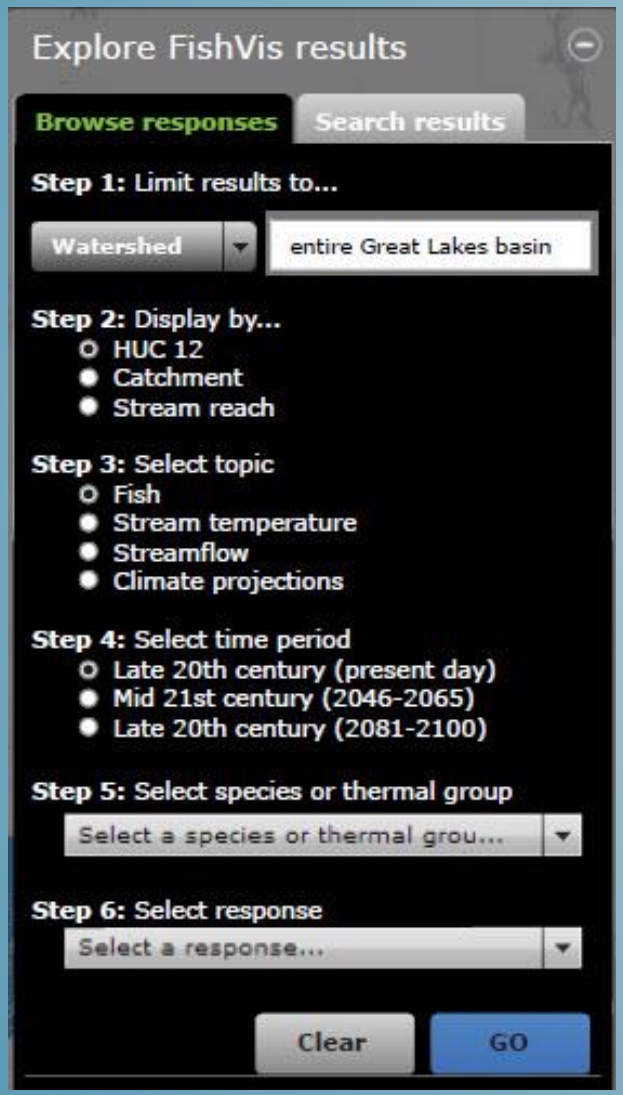


Download: download results (tabular or shapefile)

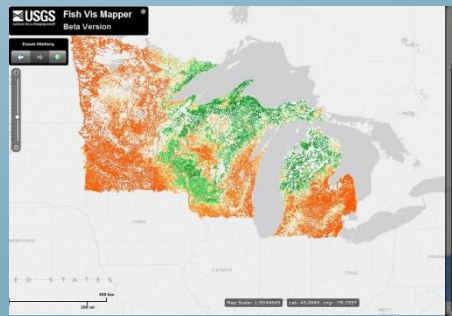


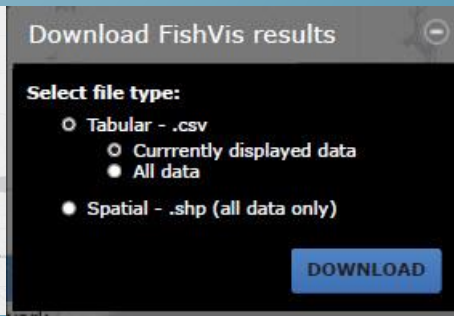
FishVis Browse results

- Pre-set maps
- Binned results



1. Choose your spatial extent
2. Choose your display unit
3. Select your topic
4. Select your time period
5. Select your species or thermal group
6. Select your response
7. FishVis will map your results





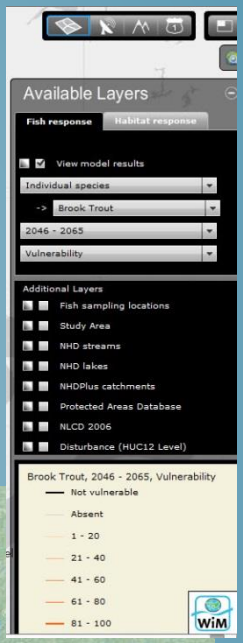
Choose Your Response

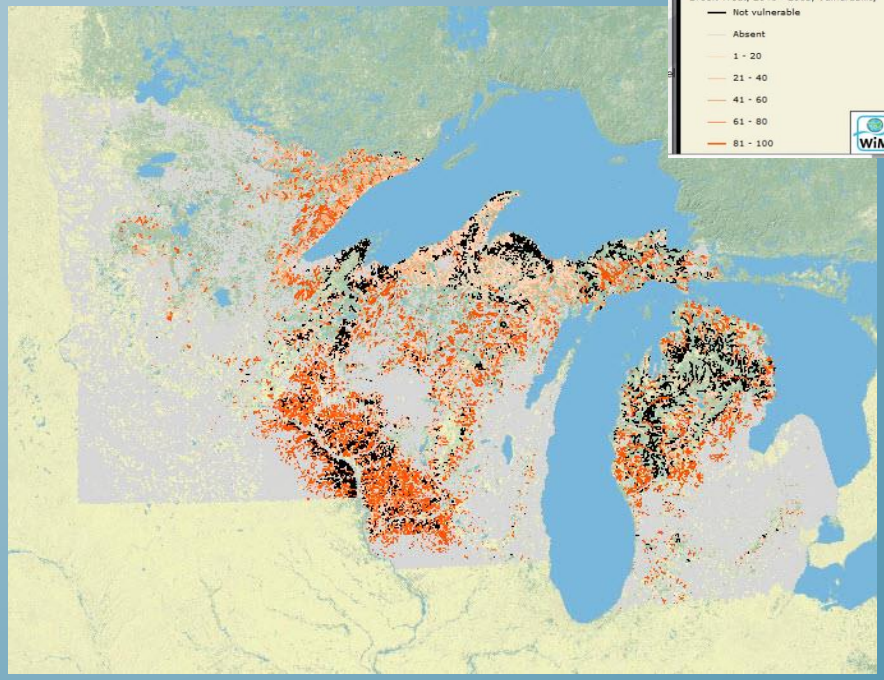
USGS science for a changing world — Fish Vis Mapper Beta Version

Fish Response (14 species)

- Occurrence
- Probability
- Vulnerability
- Opportunity
- Species Lost/Gained

Example:
CHOOSE A SPECIES > Brook Trout
TIME PERIOD > 2046 - 2065
Response > Vulnerability

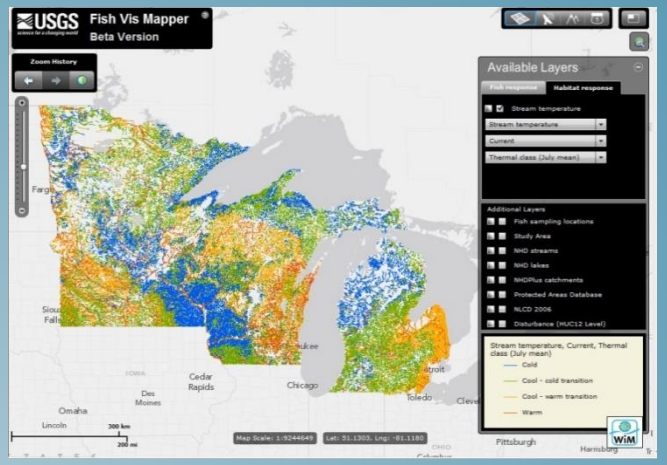




Choose Your Time Period

- Current
- 2046 – 2065
- 2081 - 2100

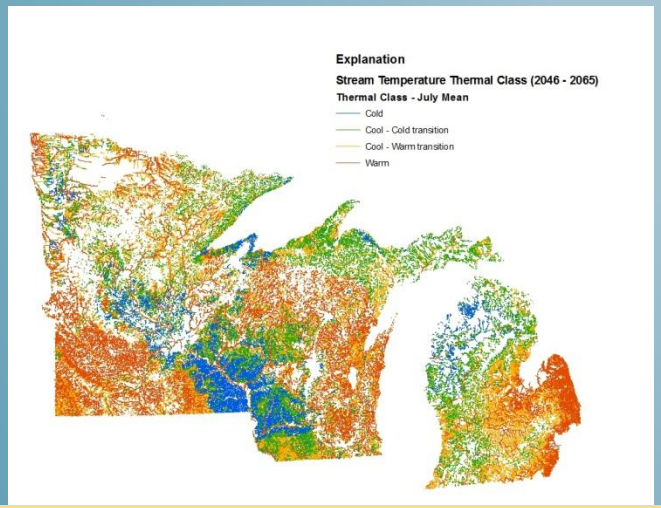
HABITAT RESPONSE

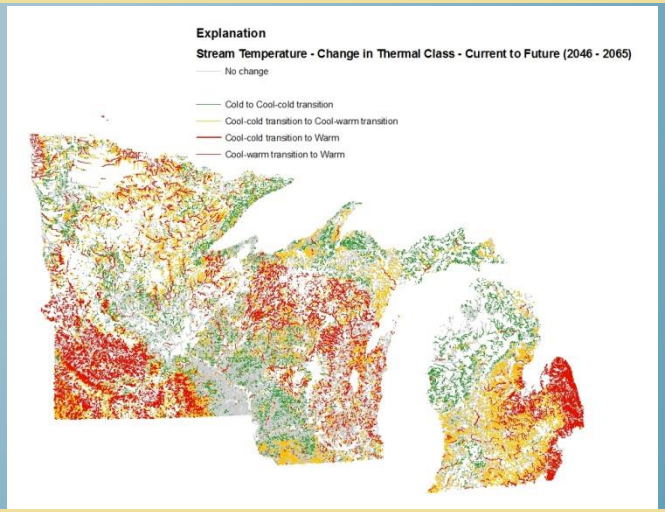


Stream temperature
Flow exceedance
Climate

- Air temperature
- Precipitation

Habitat Metric > Stream Temperature
TIME PERIOD > Current
Response > Thermal Class (July Mean)

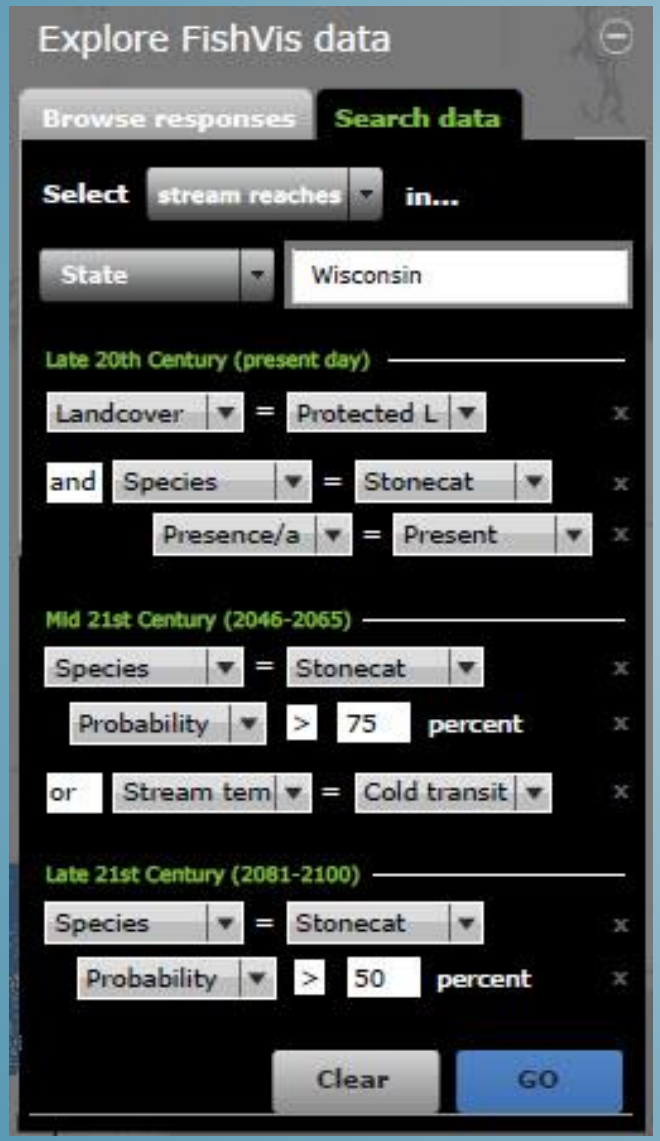




Habitat Metric > Stream Temperature
TIME PERIOD > Future (2046 – 2065)
Response > Thermal Class (July Mean)

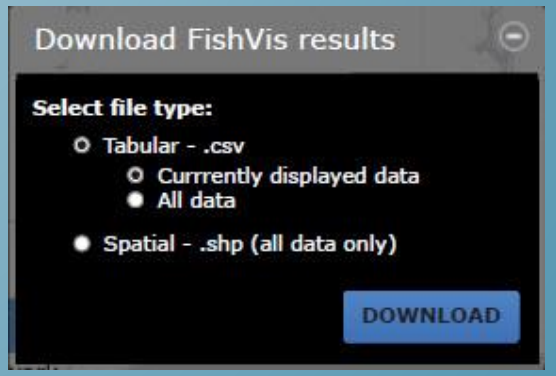
Habitat Metric > Stream Temperature
TIME PERIOD > Future (2046 – 2065)
Response > Thermal Class Change

FishVis functionality



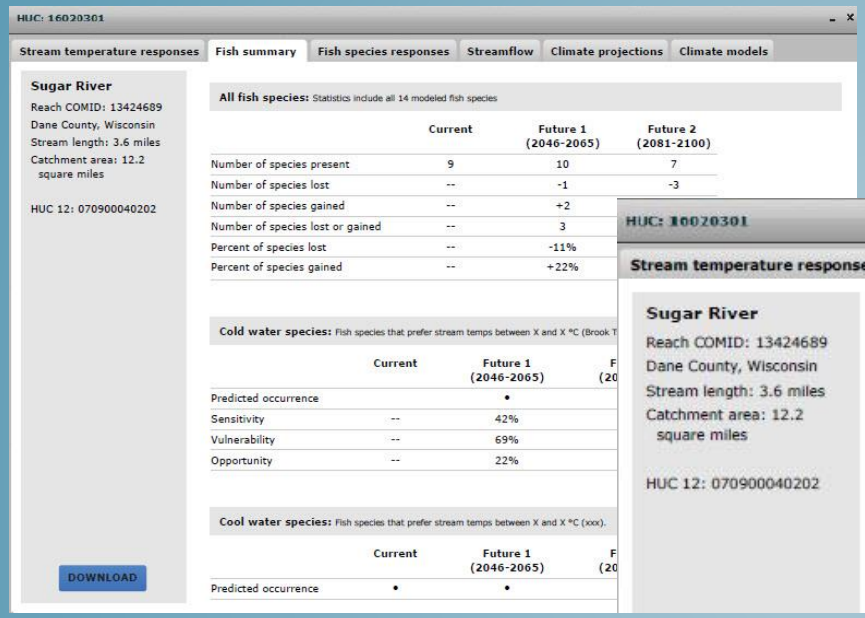
SEARCH data · Customize your search

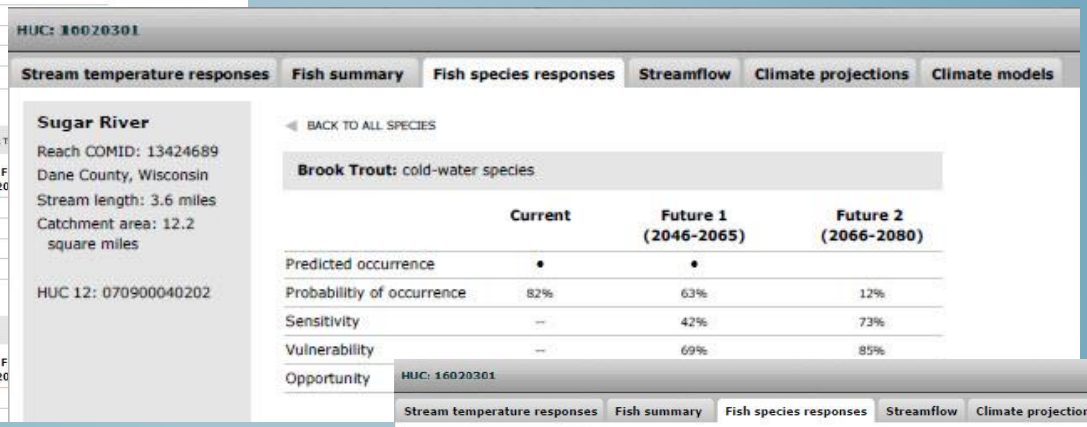
- Returns all records that meet your criteria
- Select spatial mapping unit
- Select spatial extent
- Enter criteria
- FishVis will map your results

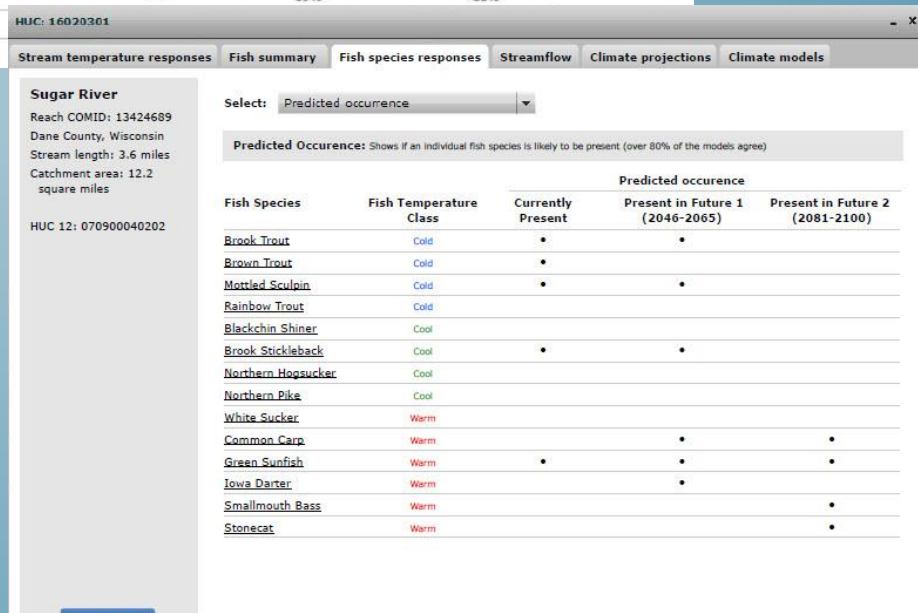


FishVis Popup summaries

Click on stream reach and View information popup







Summary Tables

Stream Temperature

Stream Flow Exceedance

Fish Species Response

Fish Species Loss and Gain

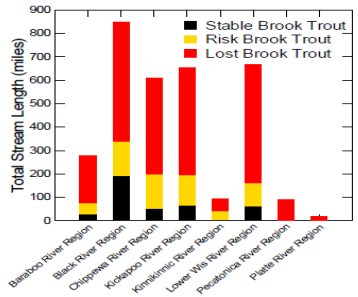
Climate projections

Driftless Area Master Planning (Cunningham, WDNR)

REPORT CARD

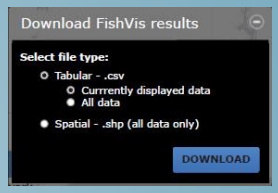
			Watersheds														
			Ames Branch - Pecatonica River	Blue Mounds Branch	Dodge Branch	East Branch Pecatonica River	Headwaters Pecatonica River	Headwaters Sugar River	Honey Creek - Pecatonica River	Little Sugar River	Mineral Point Branch	Ridgeway Branch - E B Pecatonica	Spafford Creek - Pecatonica River	Story Creek-Sugar River	West Branch Sugar River	Yellowstone River
Brook Trout	Stream Health and Habitat Quality	Natural Habitat Potential	F	F	F	F	F	C	F	F	F	F	F	C	D	F
		Land Use Stress	F	F	F	F	D	F	F	F	F	D	F	F	F	F
	Sport Fishery Performance	Stock (5" up to 8")	F	F	F	F	F	F	F	F	C	F	F	C	D	F
		Quality (8" up to 12")	F	F	F	F	F	F	F	F	D	F	F	C	C	F
		Memorable (12" +)	F	F	F	F	F	F	F	F	B	F	F	D	F	F
	Projected resilience to climate change		D	D	D	D	D	D		D	D	D		D	D	D
Brown Trout	Stream Health and Habitat Quality	Natural Habitat Potential	B	A	A	B	D	A	D	B	A	A	D	D	A	A
		Land Use Stress	F	B	F	D	F	F	D	D	F	B	F	D	D	D
	Sport Fishery Performance	Stock (6" up to 10")	F	B	C	D	D	C	D	C	C	D	D	A	A	C
		Quality (10" up to 15")	F	B	D	C	C	B	D	D	B	C	F	A	B	D
		Memorable (15" +)	F	B	F	F	F	A	F	F	F	F	F	B	B	F
	Projected resilience to climate change		D	C	D	B	D	D	C	B	C	C	D	C	C	D
Small-mouth Bass	Stream Health and Habitat Quality	Natural Habitat Potential	B	D	F	B	C	D	A	C	C	C	B	C	D	C
		Land Use Stress	B	F	B	D	C	C	F	F	D	F	B	D	D	B
	Sport Fishery Performance	Stock (8" up to 14")	F	F	F	F	B	F	D	D	A	F	F	A		B
		Memorable (14" +)	F	F	F	F	F	F	F	D	A	F	F	A		F
	Projected gain from climate change		A	B	A	A	A	A	A	B	A	B	A	D	B	A
Trout Stream Habitat	Thermal stability of trout streams		B	D	D	C	C	D	A	D	C	D	D	C	D	A
	Total miles of trout stream restoration		F	A	B	F	F	F	F	F	F	F	D	F	A	D
Recre-ation	Angling opportunities	Percent of trout stream miles with public access	B	C	A	D	D	C	F	C	D	B	D	A	B	A
		Percent of smallmouth bass stream miles with public access	C	F	A	F	D	F	D	A	F	D	F	B	F	F
	Supply relative to demand	Miles of publicly-accessible trout and SMB streams per 100K people within a 1-hour drive	C	C	C	D	D	D	D	C	D	C	D	C	B	C

Figure 2.29: Climate effects on brook trout distribution (2046 – 2065).



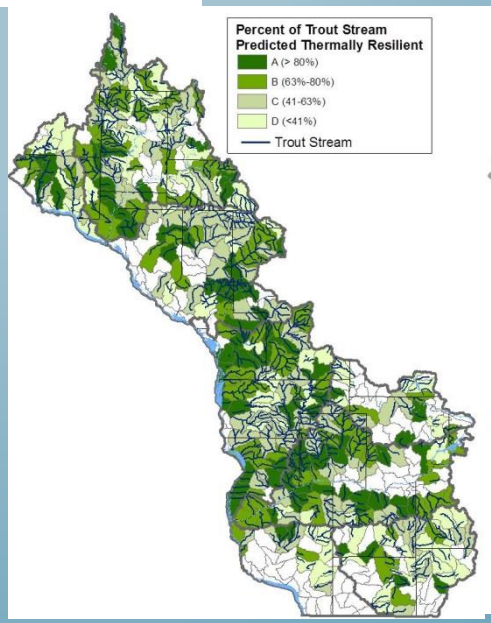
View and query results in FishVis

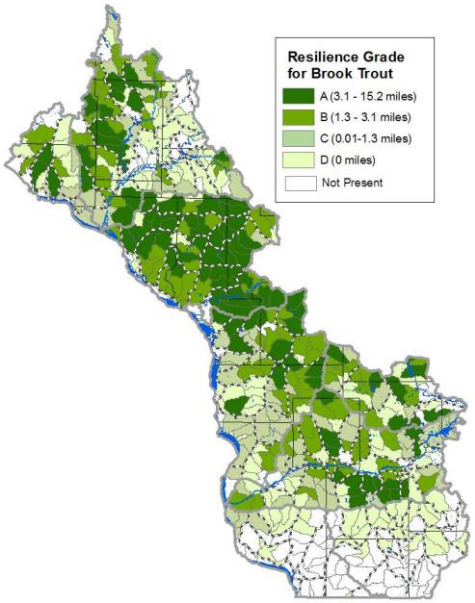
Future - Download results



Use information for planning

- Stream Health and Habitat Quality
- Sport Fishery Performance
- **Thermal Resilience of trout streams**
- **Response of trout & small mouth bass to Climate Warming**
- Public Access for trout & SMB angling
- Stream restoration work





FISHVIS

http://wim.usgs.gov/FishVisMapper/FishVis.html

Stakeholders meeting planned for November 2013 – stay tuned

WISCONSIN DEPT. OF NATURAL RESOURCES

USGS science for a changing world

U.S. FISH & WILDLIFE SERVICE

SPORT FISH RESTORATION

Your purchase of fishing equipment and motor boat fuel supports boating access and Sport Fish Restoration.

MICHIGAN STATE UNIVERSITY Founded 1855

INTERNATIONAL JOINT COMMISSION · COMMISSION MIXTE INTERNATIONALE

Department of Natural Resources

Michigan.gov An Official State of Michigan Web Site